



# PATENT SPECIFICATION

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341,105

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## COMPLETE SPECIFICATION.

### Improvements in and relating to a Fuel Atomizer for Internal Combustion Engines.

I, VICTOR DEER, of Nr. 2 Backersvej, Copenhagen, Denmark, Danish subject, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a fuel injection nozzle for internal combustion engines employing solid injection of the fuel, that is, without the use of compressed air, the fuel being forced under high pressure through fine atomizing passages.

The present invention relates more particularly to that type of fuel injection nozzle in which the supply of fuel to the atomizing passages is controlled by a valve, such as a needle valve or valve spindle, actuated by mechanical means so that it is opened at the beginning of the injection period, or spring-loaded and lifted from its seat by the pressure of the liquid fuel during the injection period.

It has been previously proposed to pass the fuel through a set of radial passages leading from a central chamber into a series of longitudinal channels from which inwardly directed tangential atomizing passages supply the fuel to a cavity or chamber centrally within which the delivery orifice is arranged.

According to the present invention a plurality of sets of fine atomizing passages arranged in series are provided and intermediate chambers are interposed between the successive sets of atomizing passages, said passages leading from a central chamber or intermediate chamber and all being directed radially or substantially radially outwards throughout their length and the fuel passes through the final set of passages into the combustion chamber, without being subjected to a whirling motion in its passage through the intermediate chamber or chambers. By this arrangement the atomization or breaking up of the fuel into fine particles is improved owing to it being performed in several stages. The fuel is first forced out through the first set of atomizing passages into a cavity or intermediate chamber. The volume of this cavity or cham-

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ber is so small in relation to its surface that the quantity of air contained therein is insufficient for ignition or burning of the fuel. When the latter has been mixed with the small quantity of air in the cavity after its first atomization it is injected through another set of atomizing passages, whereby it is further atomized. Alternatively the atomization may be continued in still more stages.

The invention is illustrated in the drawing.

Figs. 1 and 2 are longitudinal sections through two different constructional forms of an atomizer according to the invention.

In fig. 1, 1 is the lower portion of a fuel valve housing, to which a cap nut 2 is screwed. 3, 4, 5 are three injection nozzles or atomizers which are mainly similar and co-axial and placed one inside the other, each of them being shaped as a cap provided with atomizing passages. The caps 3, 4, 5 are clamped together and secured to the valve housing by the cap nut 2, their concoidal or conical surfaces 6, 7, 8 fitting oil-tight together. The surfaces 6, 7 & 8 may alternatively be shaped like mutually fitting spherical surfaces. The uppermost cap or atomizer 5 has a plane top surface 9 fitting oil-tight to another plane surface 10 at the bottom of the valve housing.

11 is a conical valve seat in the injection nozzle 5 corresponding to a conical end surface of the valve spindle 12 which closes a central bore 14 in the nozzle 5. At the bottom of the latter a number of fine atomizing apertures 15 issue from the bore 14. The caps 4, 3 are provided with similar atomizing apertures 17, 19 respectively.

The device acts as follows:

When the fuel, which is supplied through the passage 13, is pressed through the bore 14 and the atomizing apertures 15, it passes out into the cavity 16 between the injection nozzle 5 and the atomizer 4, and owing to the great discharge speed it is thoroughly mixed with the small quantity of air contained in the cavity 16. During the first part of the period in which the fuel enters the cavity 16 the pressure in the latter rises and the

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Fig. 1.

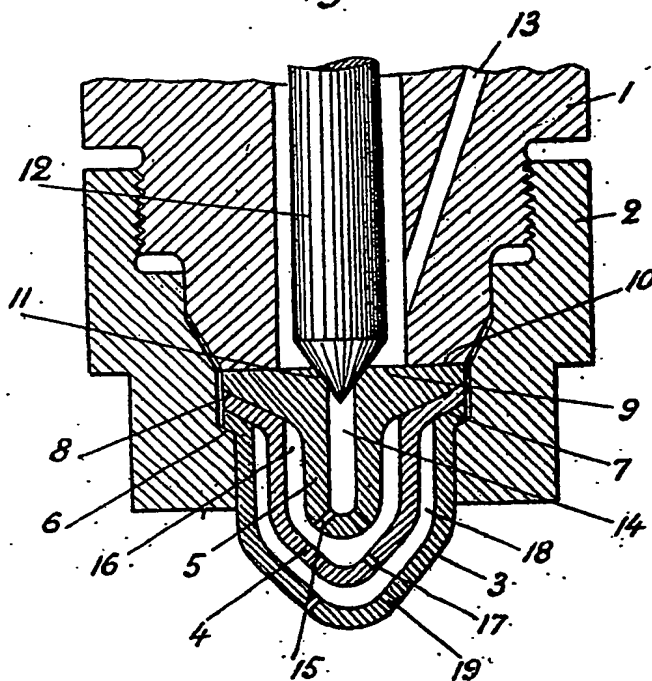
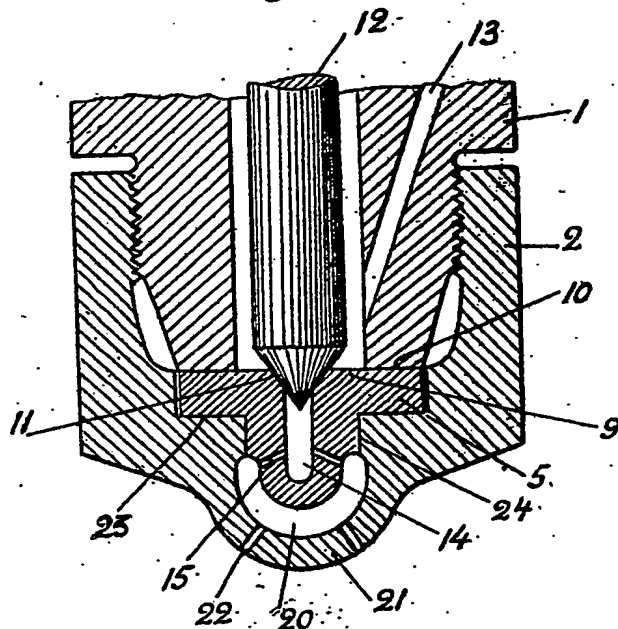


Fig. 2.



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[This Drawing is a reproduction of the Original on a reduced scale.]

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